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ABSTRACT

This study examined the effects of high, mixed, and low rates of specified sequenced teacher behaviors (specific observation followed by reinforcement) engaged in by elementary school teachers on the academic learning time-physical education (ALT-PE) of students. The high rate was defined as teacher engagement in five per minute or more episodes of specific observation followed by reinforcement. The low rate was defined as teacher engagement in one per minute or less episodes of either specific observation or reinforcement. Mixed rate was defined as teacher engagement in five per minute or more episodes of specific observation but one per minute or less episodes of reinforcement. It was hypothesized that high rates would significantly increase the percentage of ALT-PE engaged in by students as compared to the other two rates. Subjects of the study were six males and six females selected from two different classes who engaged in 15 sessions of physical education activities with different sequences of teacher behaviors for each class in each session. Teacher behavior categories are identified and defined as follows: to encourage, to reinforce, to correct/punish, to manage, to instruct, to model, and to physically guide. Student behavior categories are identified and defined as follows: motor appropriate, motor inappropriate, supportive, cognitive, on-task, off-task, and interim. Findings supported the hypothesis on the effectiveness of the high rate of observation accompanied by reinforcement. An analysis is presented of findings in each category. References and tabular data are included. (JD)

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Effect(s) of Specified Teacher Behaviors on Student ALT-PE

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Running Head: ALT-PE

The purpose of this investigation was to examine the effects that high, mixed and low rates of specified sequenced teacher behaviors (specific observation followed by reinforcement) engaged in by elementary school educators had on the ALT-PE of students participating in public school physical education classes.

The independent variable in this study was defined as the rate of the teacher behaviors specific observation followed by reinforcement in sequence. There were three levels of condition: high, mixed and low. The high rate was defined as the instructors engagement in 5.0 per minutes or more episodes of specific observation followed by reinforcement. The low rate was defined as the teachers engagement in 1.0 per minute or less episodes of either specific observation or reinforcement. The mixed condition was defined as teacher engagement in 5.0 per minute or more episodes of specific observation but 1.0 per minute or less episodes of reinforcement. The dependent variable in this study was defined as the percentage of ALT-PE engaged in by the subjects.

It was hypothesized that:

1. High rates of specific observation followed by reinforcement in sequence by the instructors would significantly increase the percentage of ALT-PE engaged in by students as compared to low rates of the specified instructor behaviors.
2. Mixed rates of specific observation followed by reinforcement in sequence engaged in by the instructor would significantly increase the percentage of engagement in ALT-PE by students as

compared to low rates of the engagement in the specified sequence by the instructor.

1. A multi-element research design was employed in this study. The three levels of condition were arranged in an order in which each preceded and followed every other condition at least twice. The order of presentation was as follows:

Session Number	Class	
	A	B
1	M	H
2	H	L
3	M	H
4	L	M
5	H	L
6	L	M
7	M	H
8	H	L
9	L	M
10	H	L
11	M	H
12	H	M
13	L	L
14	M	M
15	L	H

Conditions: H = High Condition
M = Mixed Condition
L = Low Condition

2. Six students (3 males/3 females) were randomly selected from each class. These students were systematically observed thoughout the treatment period.

3. All study sessions were filmed utilizing a JVC split-screen video-cassette recording system.

   A. One camera continuously monitored teacher behavior.

   B. The remaining camera monitored student behavior in one minute

time blocks as the subjects engaged in beginning volleyball skills at five stations set up in a public school gymnasium.

1. Each subject had access to his/her own equipment at each station.
2. Each subject had an individualized program to monitor his/her progress.

4. Data was collected by a West Virginia University Doctoral Candidate.
   A. Teacher and student behaviors were classified through the utilization of a behavior coding system devised by Wiegand, Hawkins and Bahneman (1982).
   B. Collector attained a +.85 reliability coefficient with both a training tape and an associate professor who devised the code.
   C. Collector observed the tapes in a random order established by the investigator.
      1. Collector recorded data utilizing an electronic microprocessor.
      2. Investigator extracted the data from the microprocessor and recorded it on a prepared data spread sheet.
5. Data was analyzed in the following manner:
   A. Percentage levels of each student behavior category were plotted across time and with respect to each independent variable condition.
   B. Visual inspection was employed to determine differences in

level, trend and variations in latency of the effect of the manipulation of the independent variable with respect to each category graphed.

C. Each experimental groups' data was separately and collectively graphed.

D. Data was also analyzed via application of analysis of variance to determine whether significant differences in each student behavior category existed among the means observed during low, high and mixed conditions at the .05 level of statistical significance.

E. Post hoc analysis was performed through the utilization of Duncan's Multiple Range Test calculated at .05 significance level.

F. Correlations were calculated among the eight student behavior categories observed to determine whether there were relationships among these variables.

Table 1: Teacher Behavior Categories

General Observation

Teacher is watching student groups or individuals engaged in any category of student behavior. The teacher must not be engaged in any other category of teacher behavior in order to record general observation. This category includes passive supervision, and there is no relationship of the observation to an instructional focus.

Encourage

Teacher makes a verbal statement the purpose of which is to enhance the student's perception of their ability to accomplish a subsequent task. The teacher is not telling the student what to do (an instructional prompt) but is clearly trying to build confidence.

Reinforce

Teacher makes a positive verbal statement or gesture following an appropriate student behavior (skill or organizational) clearly designed to increase or maintain such responses in the future. The reinforcer must follow soon enough after the behavior that the student clearly associates it with the behavior.

Corrective/Punishment

Teacher makes a negative or critical verbal statement or gesture following an inappropriate student behavior (skill or organizational) clearly designed to decrease such responses in the future. The statement or gesture must follow soon enough after the behavior that the student clearly associates it with the behavior.

Managerial

Teacher is engaged in carrying out a non-subject matter task (setting up equipment, taking roll, collecting papers, etc.) teacher may be directing students verbally in a management task.

Instruction

Teacher is verbally describing to the students how to do a skill, or is using a verbal prompt to direct students in attempting a skill or activity. The activity must be a subject matter task in order to record instruction.

Modeling

Teacher demonstrates to students how to do a subject matter task, or participates with students in a subject matter task or activity.

Physical Guidance

Teacher physically guides students through a subject matter task or activity. A physical guidance prompt or spotting as long as there is physical contact are examples of physical guidance.

Non-Task Verbal

Teacher talks to students about non-subject matter and/or non-managerial subjects. Commenting on student's clothing or talking about what one student did over the weekend are examples of non-task verbal behavior.

Off-task

Teacher is not paying attention to what are clearly his/her responsibilities regarding the class at hand. A teacher who is making notes on what to do during football practice during the course of a physical education class would be off task.

Specific Observation

Teacher is watching <u>one</u> student engaged in a subject matter task for the purpose of providing feedback related to performance. Teacher position must be proximal to student position so that observation is clearly focused on a specific student who is performing. Specific observation <u>could</u> be scored when teacher is watching pairs or small groups when the instructional focus is

clearly on a group task, e.g., observation of five players executing a fast break during an instructional session on the fast break.

Table 2: Student Behavior Categories

Motor Appropriate (MA)

The student is engaged in a subject matter motor activity in such a way as to produce a high degree of success.

Motor Inappropriate (MI)

The student is engaged in a subject matter oriented motor activity but the activity-task is either too difficult for the individual's capabilities or the task is so easy that practicing it could not contribute to lesson goals.

Supporting (MS)

The student is engaged in subject matter motor activity the purpose of which is to assist others learn or perform the activity such as spotting in gymnastics, feeding balls to a hitter in a tennis lesson, or clapping a rhythm for a group of students who are practicing a movement pattern.

Cognitive (C)

The student is appropriately involved in a cognitive task such as listening to teacher describe a game, listening to verbal instructions about how to organize, watching a demonstration, participating in a discussion, or watching a film.

On-Task (ON)

The student is appropriately engaged carrying out an assigned non-subject matter task (a management task, a transition task, a

warm-up task) such as moving into squads, helping to place equipment, counting off, doing warm-up exercises, or moving from the gym to a playing field.

Off-Task (OF)

The student is either not engaged in an activity he/she should be engaged in or is engaged in activity other than the one he/she should be engaged in - behavior disruptions, misbehavior, and general off-task behavior, such as talking when a teacher is explaining a skill, misusing equipment, and fighting.

Interim (I)

The student is engaged in a noninstructional aspect of an ongoing activity such as retrieving balls, fixing equipment, retrieving arrows, or changing sides of a court in a tennis match.

Waiting (W)

Student has completed a task and is awaiting the next instructions or opportunity to respond such as waiting in line for a turn, having arrived at an assigned space waiting for the next teacher direction, standing on a sideline waiting to get in a game, or having organized into the appropriate formation waiting for an activity to begin.

Table 1: Analysis of Variance: Percentage of ALT-PE

Source	DF	Sum of Squares	Mean Square	FRatio
Condition	2	88.46	44.23	3.24*
Within	27	386.90	13.66	
Total	29	457.36		

*Significant at .05 alpha level.

Post hoc analysis utilizing Duncan's New Multiple Range Test indicated that a statistically significant difference ($p>.05$) existed between the high (24.4%) and low (20.2%) treatment means. No statistically significant differences were found to exist between the high and mixed (22.1%) or mixed and low conditions.

Table 2: Pearson Product-Movement Correlation Coefficients

ALT-PE: Student Behaviors

	IV	Motor Inap	Motor Sup	Cog	OT	OF	Int	Wt
ALT-PE	+.439*	+.036	-.111	+.365*	+.042	-.441*	-.364*	-.349

*Significant at .05 alpha level.

In addition to the results reported above, a correlation of -.445 ($p >.01$) was found to exist between the independent variable and the behavior category off-task.

NOTE: These statistically significant correlations suggest that a class of behaviors related to what may be referred to as task avoidance occurred in the absence of the sequenced teacher behaviors. When the rate of specific observation followed by reinforcement was low, the percentage of off-task and interim increased. Since the category waiting approached statistical significance, it was speculated that this behavior might also be a member of the task avoidance class as well.

Table 3: Analysis of Variance: Task Avoidance Variables

Source	DF	Sum of Squares	Mean Square	F-Ratio
Condition	2	130.46	65.23	3.58*
Within	27	492.50	18.24	
Total	29	622.96		

*Significant at .05 alpha level.

Post hoc analysis utilizing Duncan's New Multiple Range Test indicated that a statistically significant difference ($p>.05$) existed between the high (72.4%) and low (77.5%) treatment means. No statistically significant differences were found to exist between the high and mixed (75.2%) or mixed and low conditions.

NOTE: The task avoidance variable class was composed of the collective percentages of on-task, off-task, interim and waiting student behavior.

Table 4: Analysis of Variance: Off-Task Plus On-Task Plus Interim

Source	DF	Sum of Squares	Mean Square	F-Ratio
Condition	2	133.80	66.80	5.47*
Within	27	330.50	12.24	
Total	29	464.30		

*Significant at .01 alpha level.

Post hoc analysis employing Duncan's New Multiple Range Test indicated that a statistically significant difference ($p>.05$) existed between the high (69.5%) and low (74.6%) treatment means and between the high and mixed (72.8%) treatment means. No statistically significant differences were found to exist between the mixed and low treatment means.

Table 5: Analysis of Variance: Off-Task Behavior

Source	DF	Sum of Squares	Mean Square	F-Ratio
Condition	2	28.86	14.43	3.36*
Within	27	116.10	4.30	
Total	29	144.96		

*Significant at .05 alpha level.

Post hoc analysis utilizing Duncan's New Multiple Range Test indicated that a statistically significant difference ($p>.05$) existed between the high (3.8%) and low (6.2%) treatment means. No statistically significant differences were found to exist between the high and mixed (4.9%) or mixed and low treatment means.

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6

Figure 7

Figure 8

Hypothesis Testing Summary

Visual inspection of the data graphed in Figures 1A and 1B indicated that the high condition of sequenced teacher behavior was generally accompanied by higher percentages of ALT-PE in comparison to data observed during the experimental condition. This is more clearly illustrated in the data presented in Figure 1A, where there are no overlapping data points between the high and low data and consistent levels of data may be seen. The same general conclusion may be made with respect to the data depicted in Figure 1B, although there is one overlapping data point between the high and low condition results. The mixed data graphed for both Class A and B indicate erratic and inconsistent response patterns. The mixed data overlap at several points with both the high and low data.

Statistical analysis corroborated with the visual inspection of the data. Results indicated that a statistically significant difference existed among the condition means: $F(2,29) = 3.24$, $p>.05$. Mean scores, standard deviations and post hoc analysis are reported in Table 1.

Hypothesis testing based on the data reported above indicate the following results:

Hypothesis 1: High rates of specific observation followed by reinforcement in sequence by the instructors would significantly increase the percentage of ALT-PE engaged in by students as compared

to low rates of the specified instructor behaviors.

This hypothesis was supported. Visual inspection corroborated with statistical analysis to indicate that students engaged in significantly greater percentages of ALT-PE during the high condition in comparison to the low condition.

Hypothesis 2: Mixed rates of specific observation followed by reinforcement in sequence engaged in by the instructor would significantly increase the percentage of engagement in ALT-PE by students as compared to low rates of the engagement in the specified sequence by the instructor.

This hypothesis was rejected. No clear visual differences were found to exist between the low and mixed or mixed and high conditions. Statistical analysis corroborated the rejection of thesis hypothesis.

Additional Findings

The examination of the dependent variable, percentage of ALT-PE, indicated that student response varied with respect to experimental condition imposed. Data indicate that a functional relationship existed between the rate of sequenced teacher behaviors (specific observation followed by reinforcement) and the percentage of ALT-PE. Though the purpose of this study was to examine the effect of specific sequenced teacher behaviors on ALT-PE, the concomitant data resulting from this study merits the note of teacher educators.

The highest percentage of ALT-PE was observed during the high treatment condition and the lowest percentage of ALT-PE was observed

during the low treatment condition. The question arises, then, what behaviors did students engage in other than ALT-PE during the low treatment condition?

In an effort to investigate the nature of the variance detected among the data observed during three levels of independent variable, Pearson Product-Moment Correlations were calculated among each of the eight observed student behaviors and the independent variable. The results reported in Table 2 indicated that a class of behaviors associated with task avoidance may have occurred during the low treatment condition. In order to explore this possibility, the percentages of on-task, off-task, interim and waiting were combined and analyzed.

Visual inspection of Figure 2 indicates that the low condition was accompanied by higher collective percentages of on-task, off-task, interim and waiting behavior. This is clearly indicated in the data graphed for Class A where no overlapping data points occur between the low and high conditions and differences in the levels of the data may be seen. The data graphed for Class B illustrates the same general pattern, however, the low condition data overlaps once with the high condition. The mixed data for both Class A and B were more variable in level compared to the low and high data. Mixed data points illustrating performance during both classes represent the highest and lowest points on each respective graph.

Visual analysis of the task avoidance response class was corroborated by statistical analysis. An analysis of variance was

performed on the sum of the percentages of on-task, off-task, interim and waiting behavior categories. The analysis indicated that statistically significant differences existed among treatment means: $F(2,29) = 3.58$, $p > .05$. Mean scores, standard deviations and post hoc analysis are reported in Table 3.

In an attempt to focus more clearly on the nature of task avoidance behavior, various combinations of the four variables included in the task avoidance response class were examined to detect differences among the levels of the independent variable. The following combinations were subjected to visual analysis: On-task plus off-task plus waiting; off-task plus interim plus waiting; on-task plus interim plus waiting; and off-task plus on-task plus interim.

Figure 3 illustrates the collective percentages of on-task plus off-task plus interim behavior across time across condition. Data observed during Class A clearly indicates that the low condition was accompanied by consistently higher levels of this combination of the task avoidance response class. Both of these task avoidance response classes displayed no overlapping data points. Class B data is less clear due to one overlapping data point between the high and low condition data. The same general conclusion indicated by the Class A data, however, may be made with respect to the data observed during Class B. No other combination of the task avoidance response class examined indicated clear visual results.

In addition to visual inspection the combination of the

collective percentages of on-task plus interim plus off-task behavior was analyzed via an analysis of variance. The statistical treatment of the data indicated that statistically significant differences existed among the means of this task avoidance response class $F\ (2,29) = 5.47$, $p > .01$. Mean scores, standard deviations and post hoc analysis are reported in Table 4.

In order to determine whether a response class of task avoidance was more closely associated with two of the student behavior categories included in the originally hypothesized response class, analyses were performed on the sum of the following student behavior categories: Off-task plus waiting; on-task plus waiting; interim plus waiting; interim plus on-task; off-task plus on-task; and interim plus off-task. Visual inspection of the graphs representing the collective percentages of the categories described above indicated limited and, in some cases, conflicting results. The clearest data occurred on Figure 4 which depicts interim plus on-task behavior across condition by class and Figure 5 which represents interim plus off-task behavior across condition by class.

The data illustrated for Class A in Figure 4 indicates that clear differences occurred in pattern of the low and high data. There are no overlapping data points in this graph. The high condition was accompanied by lower percentages of interim plus off-task behavior in comparison to the low condition. Class B data is much less clear as there are two overlapping data points in the data illustrated.

Class A data depicted in figure 5 indicate that differences in the trends of the low and high data occurred as no overlapping data points may be noted. The data, however, observed during Class B are not as clear. Though differences appear to exist, the response pattern indicated is erratic and the high and low condition data overlaps on two occasions.

All of the two component combinations of the task avoidance class were subjected to an analysis of variance to determine whether statistically significant differences existed among the treatment means. Statistical analysis corroborated with visual inspection as none of the analyses indicated statistical significance.

Since the analyses of the combinations of two components of the originally hypothesized task avoidance response class did not provide clear results and since the variables of off-task, interim and on-task behavior appeared to be most closely associated, it seemed appropriate to analyze these components individually.

Visual inspection of the percentage of on-task behavior across time by class in Figure 6 indicated unclear and conflicting results. High and low data patterns are marked by overlapping data point on several occasions. The Class A data indicated that mixed condition was accompanied by lower percentages of on-task behavior compared to the data representing the high condition. Class B data indicated the reverse.

The percentage of off-task behavior across time by class is illustrated on Figure 7. The high condition data graphed for Class A

and B was accompanied by consistently lower levels of off-task behavior in comparison to the low condition although there is one overlapping data point between the two conditions on each graph. The mixed data observed during both Class A and B represent the most stable response patterns displaying no changes in level or trend across time.

The percentage of interim across time by class is illustrated in Figure 8. The graphs indicate conflicting results and contain several troublesome data points obscuring the experimental effect. Class A data indicates that the high condition was accompanied by the lowest percentages of interim while the mixed condition was accompanied by a higher but stable pattern of response. Class B data indicate more erratic response patterns across condition. The mixed condition was accompanied by lower percentages of interim behavior in comparison to the high condition although one overlapping data point may be observed.

Individual analysis of variance were performed on the percentages of on-task, off-task, and interim behavior. The only analysis which indicated that statistical significance existed among the treatment means was the off-task investigation. This analysis indicated that statistically significant differences existed among the treatment means: $F(2,29) = 3.36$, $p > .05$. Means, standard deviations and post hoc analysis are reported in Table 5.

Conclusions

The results of the study predicated the following major

conclusions:

1. Specified teacher behaviors do have an effect on student behavior.
2. In the presence of the engagement of a high rate of specific observation followed by reinforcement by the teacher, a significantly higher percentage of ALT-PE was engaged in by the students.
3. In the absence of the engagement of specific observation and reinforcement by the teacher, a significantly lower percentage of ALT-PE accompanied by a significantly higher percentage of off-task behavior was engaged in by the students.
4. High correlations were found to exist among ALT-PE, interim, on-task and off-task behavior categories suggesting that when students are not closely monitored and subsequently reinforced for engagement in appropriate behavior, they tend to spend more time engaged in on-task and interim behaviors which are frequently accompanied by off-task behavior.
5. The engagement in specific observation, alone, by the instructor is not sufficient to produce the increased engagement in ALT-PE by the students.
6. No significant differences were found to exist between the mixed and low treatments implying that to develop and maintain specific student behaviors specific teacher behaviors must be contingently applied.
7. The teachers participating in this study were trained to engage

in specified behaviors which were operationally defined implying that teacher training programs could utilize the same type of training to, in part, produce more efficient teachers.

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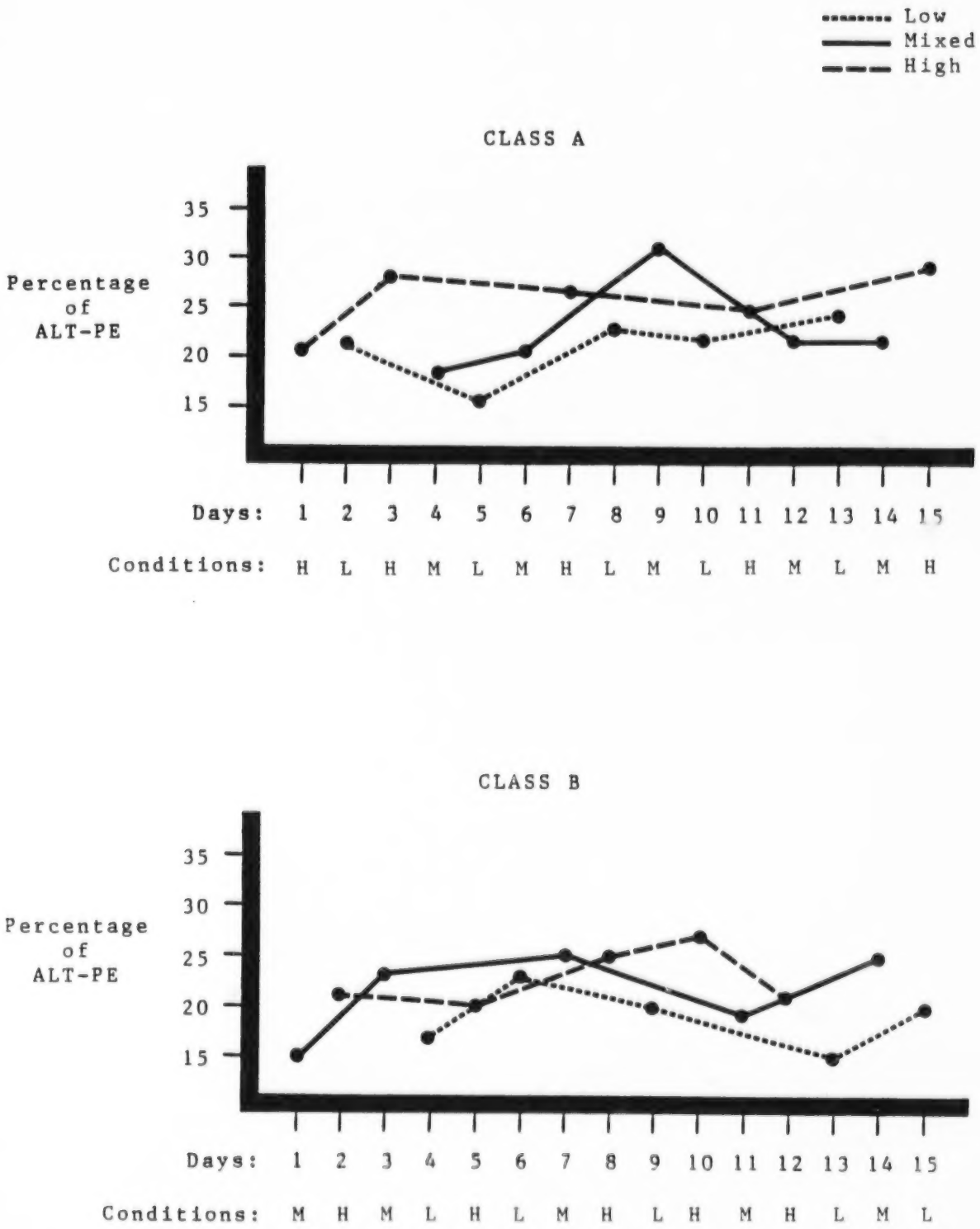

Low
Mixed
High
CLASS A
Percentage of ALT-PE
35
30
25
20
15
Days: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Conditions: H L H M L M H L M L H M L M H
CLASS B
Percentage of ALT-PE
35
30
25
20
15
Days: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Conditions: M H M L H L M H L H M H L M L

Figure 1: Percentage of ALT-PE Across Time/Condition by Class

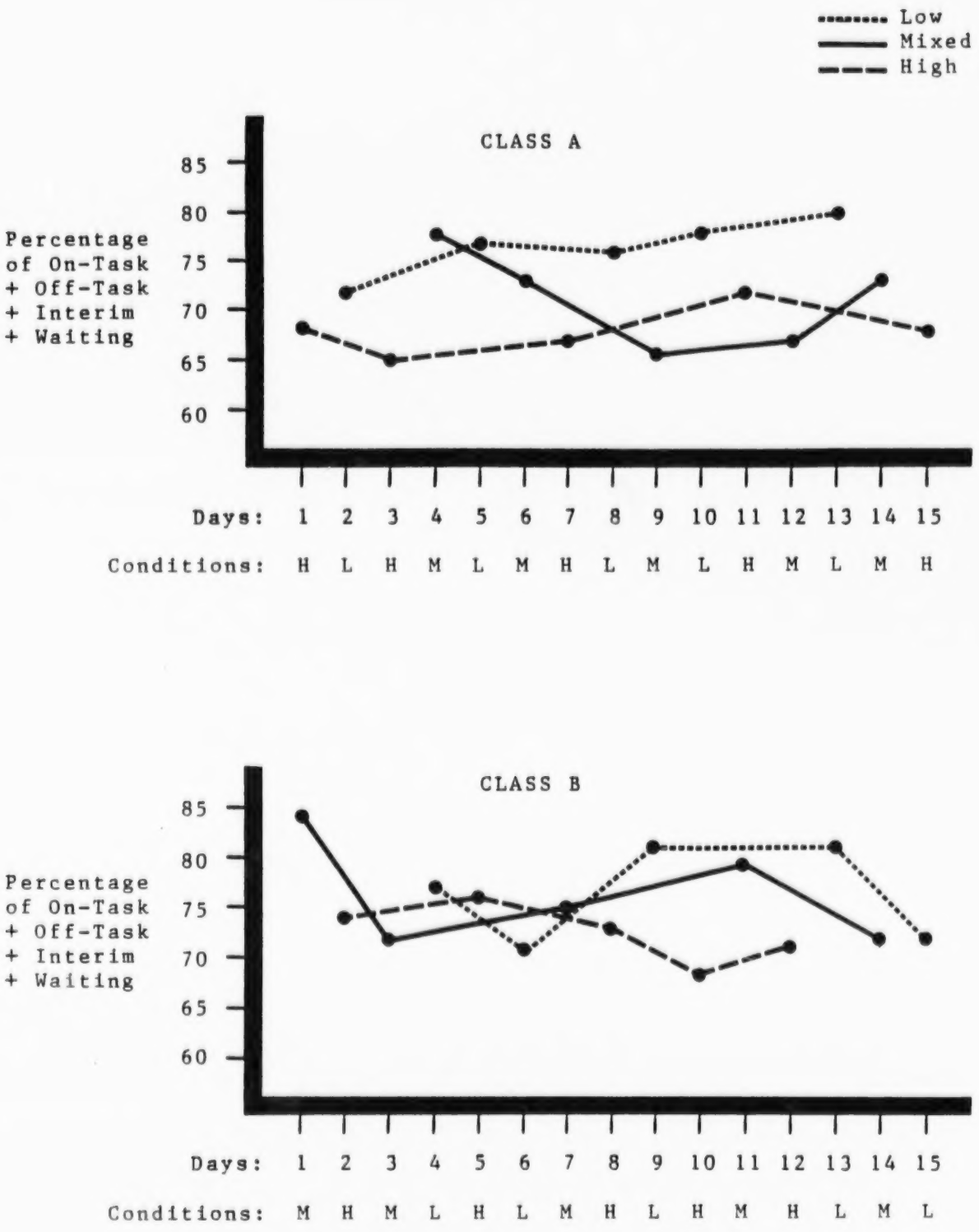

Low
Mixed
High
CLASS A
Percentage of On-Task + Off-Task + Interim + Waiting
85
80
75
70
65
60
Days: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Conditions: H L H M L M H L M L H M L M H
CLASS B
Percentage of On-Task + Off-Task + Interim + Waiting
85
80
75
70
65
60
Days: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Conditions: M H M L H L M H L H M H L M L

Figure 2: Percentage of On-Task plus Off-Task plus Interim plus Waiting Behavior Across Time/Condition by Class

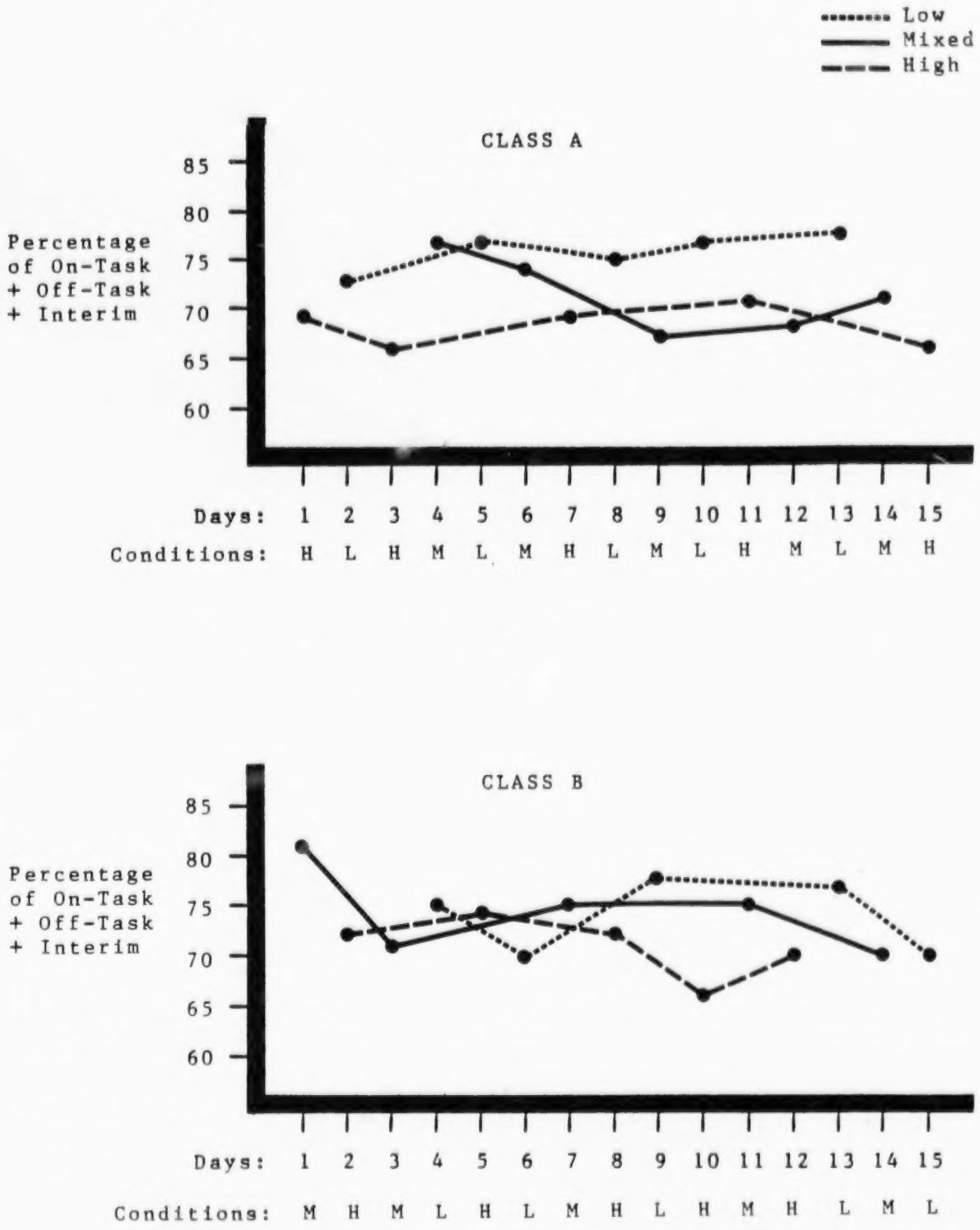

Low
Mixed
High
CLASS A
Percentage of On-Task + Off-Task + Interim
85
80
75
70
65
60
Days: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Conditions: H L H M L M H L M L H M L M H
CLASS B
Percentage of On-Task + Off-Task + Interim
85
80
75
70
65
60
Days: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Conditions: M H M L H L M H L H M H L M L

Figure 3: Percentage of On-Task plus Off-Task plus Interim Behavior Across Time/Condition by Class

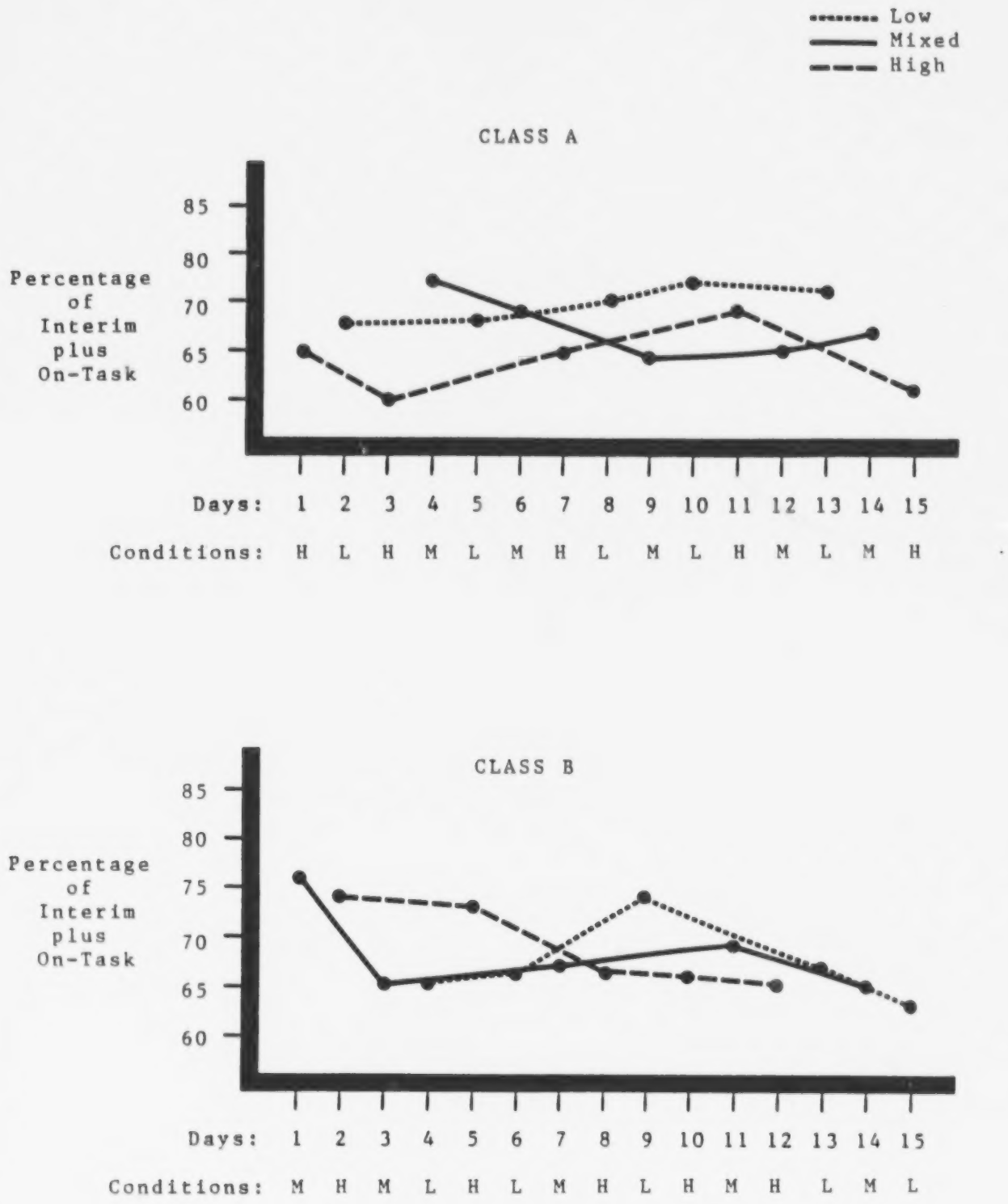

Low
Mixed
High
CLASS A
Percentage of Interim plus On-Task
85
80
70
65
60
Days: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Conditions: H L H M L M H L M L H M L M H
CLASS B
Percentage of Interim plus On-Task
85
80
75
70
65
60
Days: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Conditions: M H M L H L M H L H M H L M L

Figure 4: Percentage of Interim plus On-Task Behavior Across Time/Condition by Class

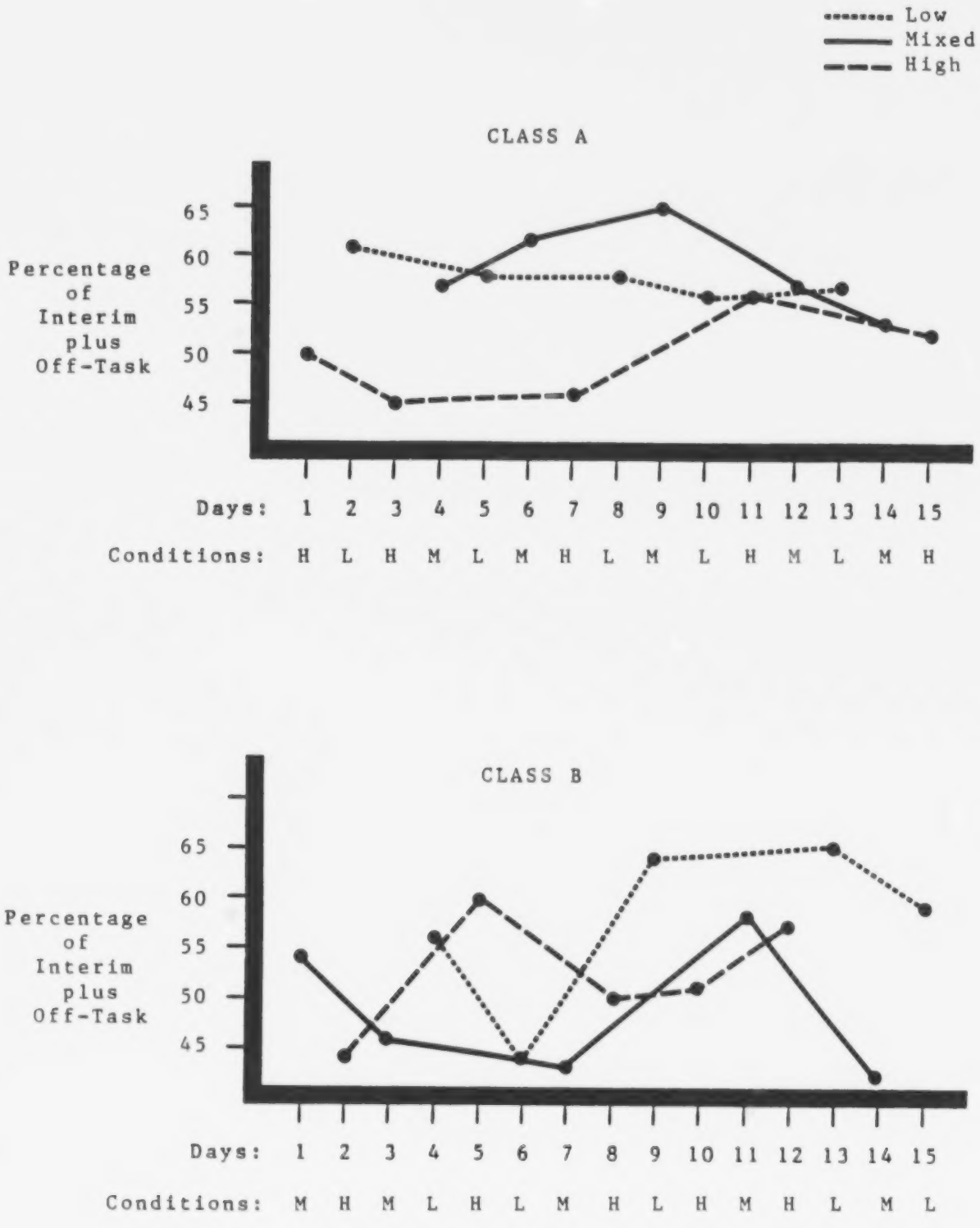
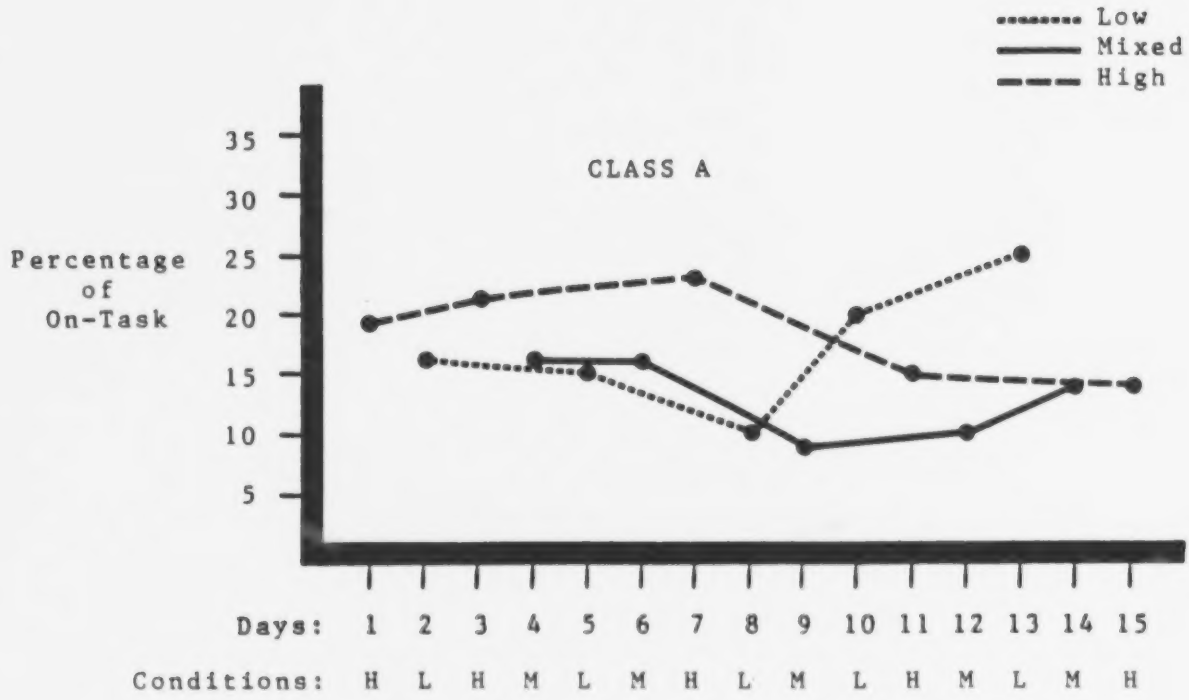

Low
Mixed
High
CLASS A
Percentage of Interim plus Off-Task
65
60
55
50
45
Days: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Conditions: H L H M L M H L M L H M L M H
CLASS B
Percentage of Interim plus Off-Task
65
60
55
50
45
Days: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Conditions: M H M L H L M H L H M H L M L

Figure 5: Percentage of Interim plus Off-Task Behavior Across Time/Condition by Class



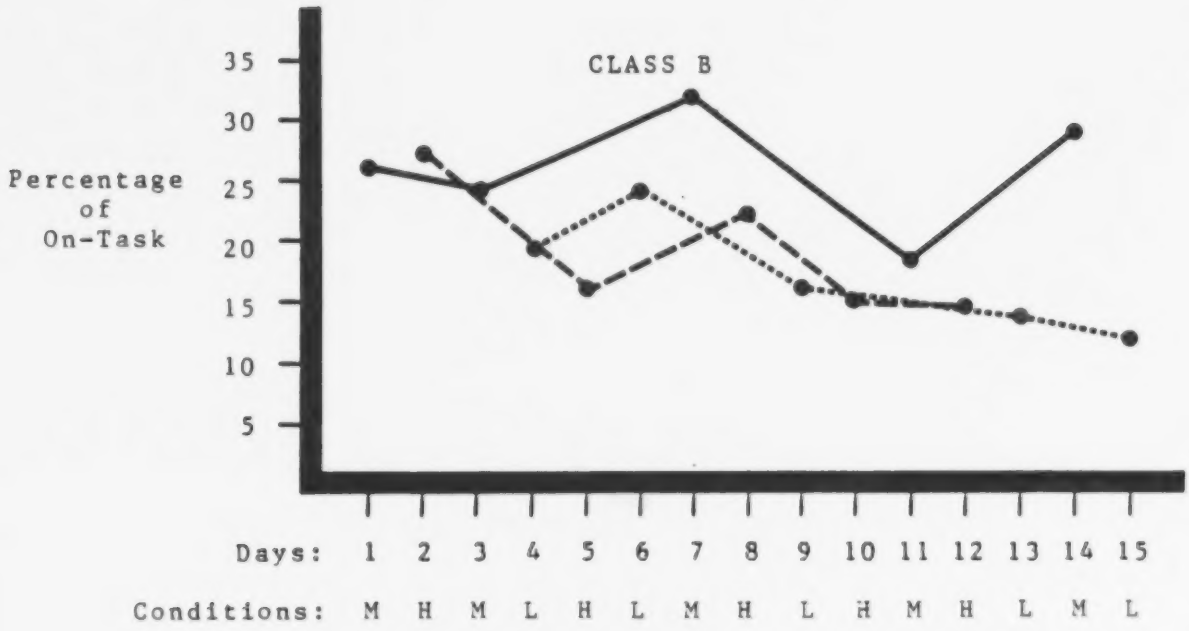


Figure 6: Percentage of On-Task Behavior Across Time/Condition by Class

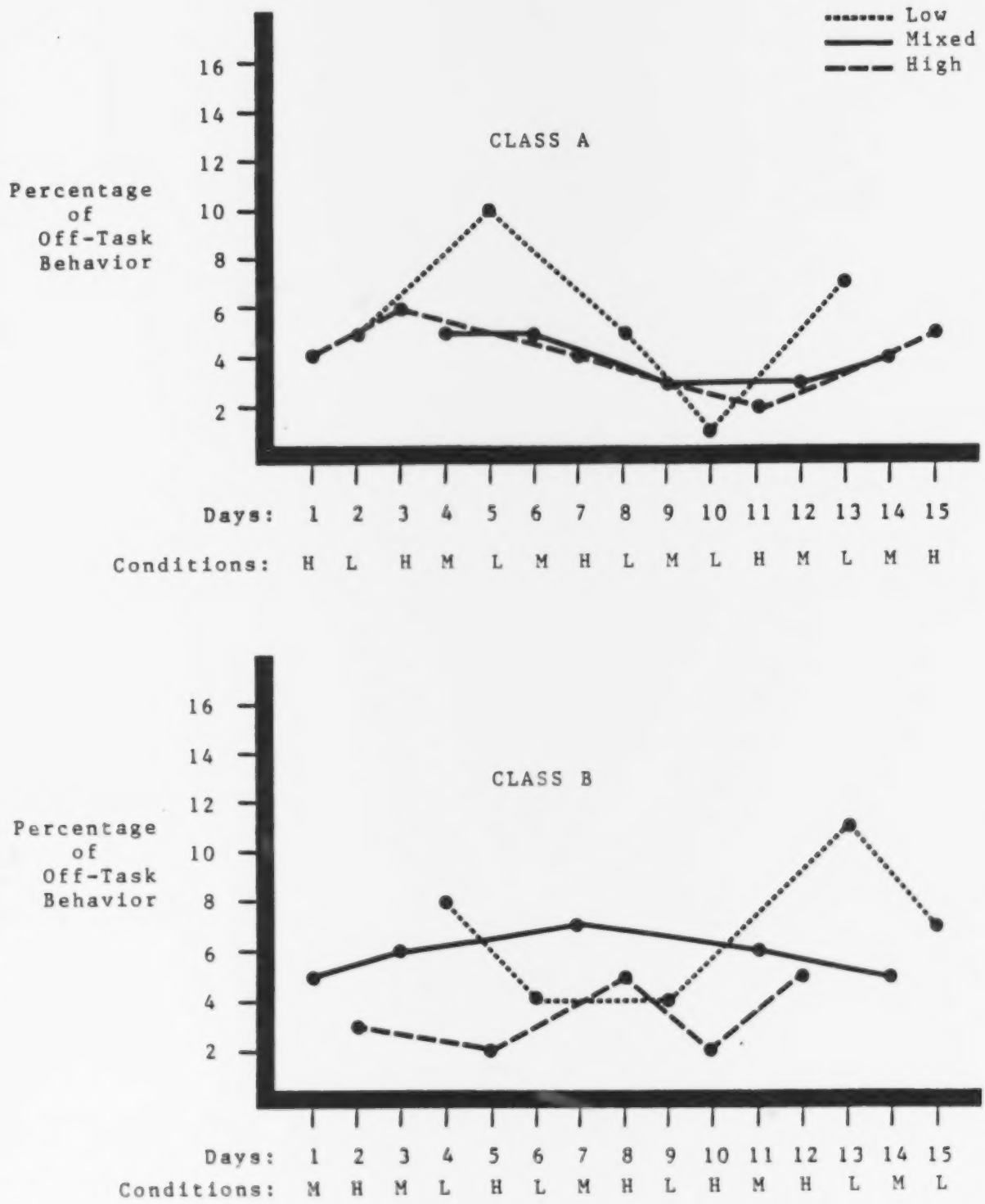
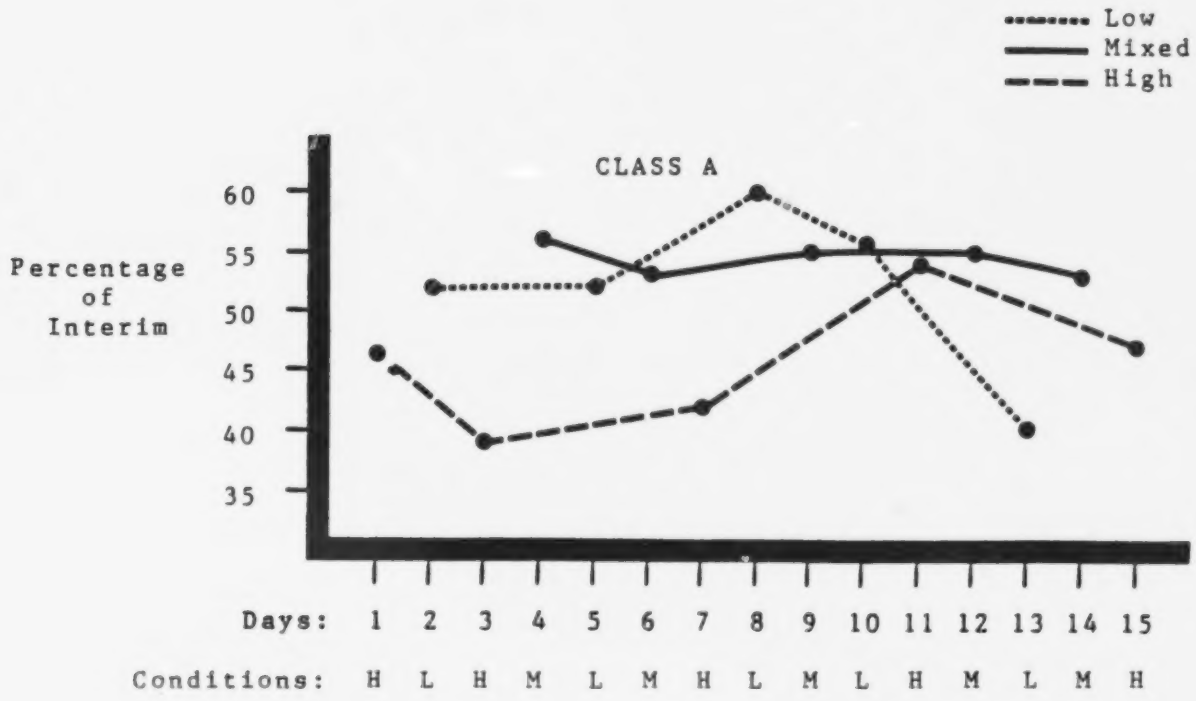


Figure 7: Percentage of Off-Task Behavior Across Time/Condition by Class



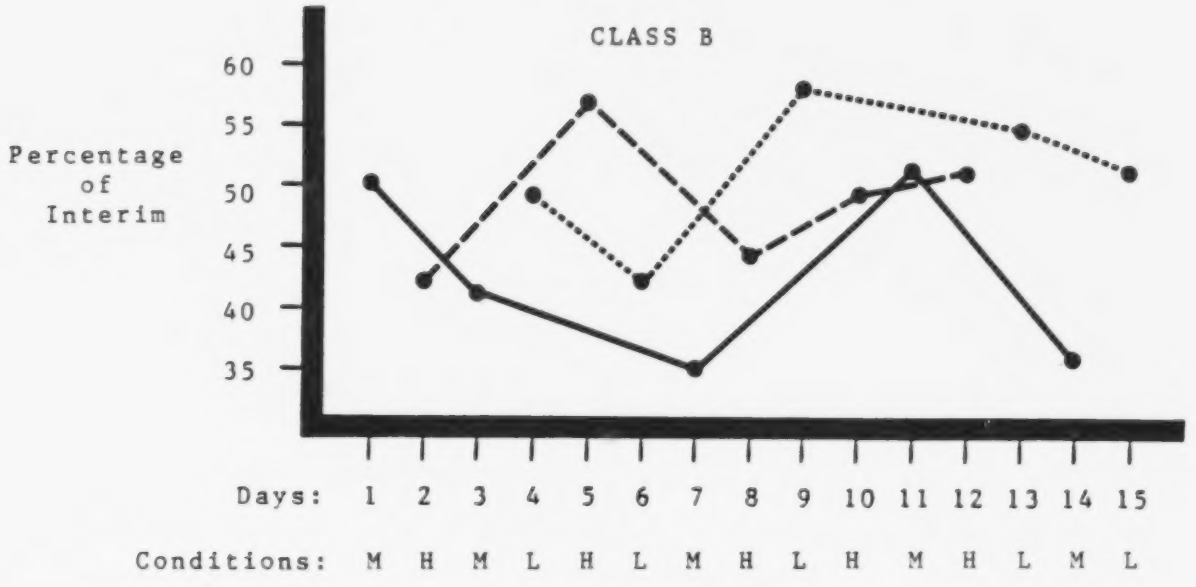


Figure 8: Percentage of Interim Behavior Across Time/Condition by Class

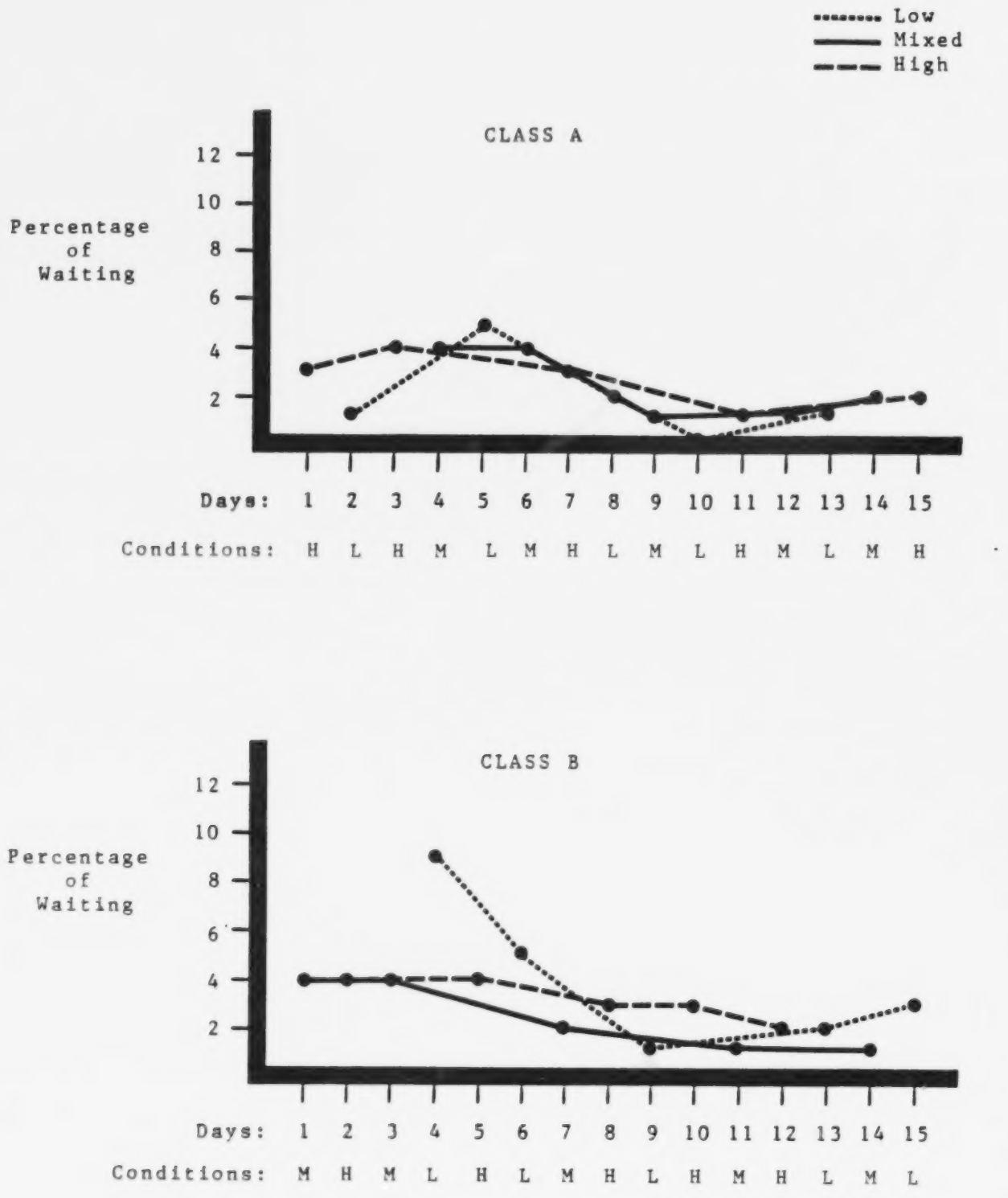


Figure 9: Percentage of Waiting Across Time by Class